इंटरनेट मानक

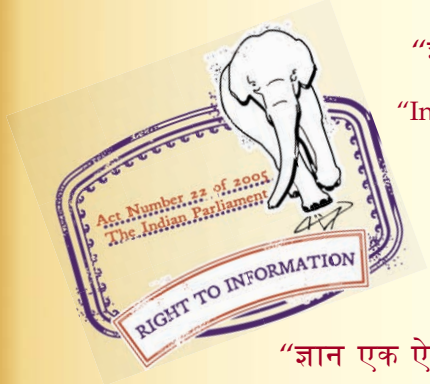
Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 11003-1 (2005): Hydraulic Fluid Power - Mounting dimensions for single Rod Cylinders 160 Mpa (160 bar) : Part 1 Medium Series [PGD 16: Fluid Power]



"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 11003 (Part 1) : 2005
ISO 6020-1 : 1998

भारतीय मानक

हाइड्रोलिक द्रव पावर — एक रॉड सिलिंडर के आरोपण आयाम, 16 मेगापास्कल (160 बार) श्रृंखला

भाग 1 मध्यम श्रृंखला

(पहला पुनरीक्षण)

Indian Standard

HYDRAULIC FLUID POWER — MOUNTING DIMENSIONS FOR SINGLE ROD CYLINDERS, 16 MPa (160 bar) SERIES

PART 1 MEDIUM SERIES

(First Revision)

ICS 23.100.20

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

March 2005

Price Group 6

NATIONAL FOREWORD

This Indian Standard (Part 1) (First Revision) which is identical with ISO 6020-1 : 1998 'Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series — Part 1 : Medium series' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Hydraulic Fluid Power Systems Sectional Committee and approval of the Medical Instruments, General and Production Engineering Division Council.

This standard was first published in 1984 based on ISO 6020-1 : 1980 'Hydraulic fluid power — Single rod cylinders — Mounting dimensions — 160 bar (16000 kPa) series — Part 1 : Medium series'. The ISO Standard has since been revised as ISO 6020-1 : 1998. To align the standard with international practices, the sectional committee, dealing with the subject, decided to revise IS 11003 (Part 1) : 1984 by adopting ISO 6020-1 : 1998 as Indian Standard under dual numbering system.

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. One component of such systems is the fluid power cylinder. This is a device which converts power into linear mechanical force and motion. It consists of a movable element, that is a piston and piston rod, operating within a cylindrical bore.

IS 11003 consists of the following parts under the general title 'Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series' :

Part 1 Medium series (*first revision*)

Part 2 Compact series (*first revision*)

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 3320 : 1987 Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series	IS 8208 : 2004 Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series (*first revision*)	Identical
ISO 4395 : 1978 Fluid power systems and components — Cylinders — Piston rod thread dimensions and types	IS 13533 : 1992 Fluid power cylinders — Piston rod thread dimensions and types	do
ISO 5598 : 1985 Fluid power systems and components — Vocabulary	IS 10416 : 1992 Fluid power systems and components — Vocabulary (*first revision*)	do

(*Continued on third cover*)

Indian Standard

HYDRAULIC FLUID POWER — MOUNTING DIMENSIONS FOR SINGLE ROD CYLINDERS, 16 MPa (160 bar) SERIES

PART 1 MEDIUM SERIES

(First Revision)

1 Scope

This part of ISO 6020 establishes metric mounting dimensions for 16 MPa [160 bar[1)]] medium series cylinders as required for interchangeability of commonly used hydraulic cylinders.

The medium series dimensions are applicable to round head cylinders with bores from 25 mm to 200 mm and to both round or square head cylinders with bores larger than 200 mm, thus allowing a wider range of applications. They admit larger ports with longer cushions that are particularly suitable for applications requiring higher velocity and rapid decelerations.

NOTE – This part of ISO 6020 allows manufacturers of hydraulic equipment, freedom in the design of metric cylinders and does not restrict technical development but does provide basic guidelines.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6020. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6020 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1179-1:—[2)], *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports.*

ISO 3320:1987, *Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series.*

ISO 4395:1978, *Fluid power systems and components — Cylinders — Piston rod thread dimensions and types.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

ISO 6099:1985, *Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types.*

ISO 6149-1:1993, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1: Ports with O-ring seal in truncated housing.*

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1) 1 bar = 0,1 MPa = 10^5 Pa; 1 MPa = 1 N/mm^2

2) To be published. (Revision of ISO 1179:1981)

ISO 6162-1:—[3], *Hydraulic fluid power — Flange connectors with split or one-piece flange clamps and metric or inch screws — Part 1: Flange connectors for use at pressures of 3,5 MPa (35 bar) to 35 MPa (350 bar), DN 13 to DN 127.*

ISO 6164:1994, *Hydraulic fluid power — Four-screw, one-piece square-flange connections for use at pressures of 25 MPa and 40 MPa (250 bar and 400 bar).*

ISO 8135:— [4], *Hydraulic fluid power – Single rod cylinders, 16 MPa (160 bar) medium and 25 MPa (250 bar) series — Tolerances.*

3 Definitions

For the purposes of this part of ISO 6020, the definitions of ISO 5598 and the following apply:

3.1 piston rod: Element that transmits mechanical force and motion from the piston.

4 Dimensions

Select dimensions for cylinders manufactured in accordance with this part of ISO 6020 from tables 1 to 6, inclusive. Select dimensions for ports and flanges from table 7 and the relevant International Standards cited therein.

All dimensions and mounting styles in this part of ISO 6020 are labelled with codes in accordance with ISO 6099.

All cylinder tolerances shall be in accordance with ISO 8135.

5 Bore sizes

This part of ISO 6020 includes the following bore sizes, in millimetres, for this medium series:

25 – 32 – 40 – 50 – 63 – 80 – 100 – 125 – 160 – 200 – 250 – 320 – 400 – 500

6 Mounting styles

This part of ISO 6020 includes the following mounting styles:

— MF1: Head rectangular flange mounting (see figure 2 and table 2)

— MF2: Cap rectangular flange mounting (see figure 2 and table 2)

— MF3: Head circular flange mounting (see figure 3 and table 3)

— MF4: Cap circular flange mounting (see figure 3 and table 3)

— MP3: Cap fixed eye mounting (see figure 4 and table 4)

— MP4: Cap detachable eye mounting (see figure 4 and table 4)

— MP5: Cap fixed eye with spherical plain bearing mounting (see figure 4 and table 4)

— MP6: Cap detachable eye with spherical plain bearing mounting (see figure 4 and table 4)

— MS2: Side lugs mounting (see figure 5 and table 5)

— MT4: Intermediate fixed or movable trunnion (male) mounting (see figure 6 and table 6)

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3) To be published. (Partial revision of ISO 6162:1994)
4) To be published. (Revision of ISO 8135:1986)

7 Piston rod characteristics

7.1 This part of ISO 6020 covers piston rods having a shouldered male thread end; see figure 1 and table 1 for basic dimensions.

7.2 Internally threaded rod ends shall be in conformance with ISO 4395.

8 Identification statement (reference to this part of ISO 6020)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this International Standard:

"Interchangeable cylinder mounting dimensions selected in accordance with ISO 6020-1, *Hydraulic fluid power — Mounting dimensions for single rod cylinders, 16 MPa (160 bar) series — Part 1: Medium series.*"

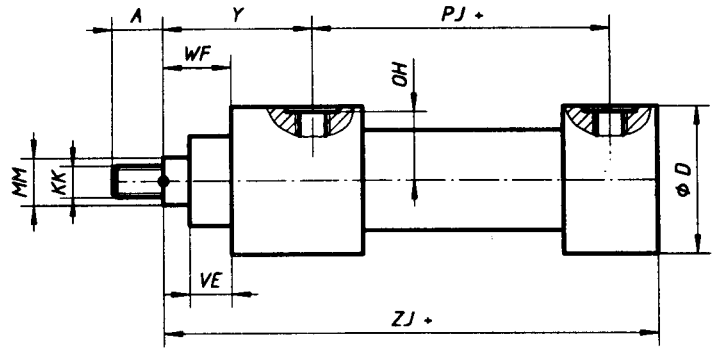


Figure 1 — General dimensions

Table 1 — General dimensions

Dimensions in millimetres

Bore	*VE*	*WF*	*ZJ*	*KK*	*MM*	*A*	*Y*	*PJ*	*D*	*OH*[1)]
25	15	28	150	M12 × 1,25	16	16	58	77	56	25,5
				M12 × 1,25	18	16				
				M14 × 1,5		18		-		
32	19	32	170	M14 × 1,5	18	18	64	89	67	30
				M14 × 1,5	22	18				
				M16 × 1,5		22				
40	19	32	190	M16 × 1,5	22	22	71	97	78	35
				M16 × 1,5	28	22				
				M20 × 1,5		28				
50	24	38	205	M20 × 1,5	28	28	72	111	95	44
				M20 × 1,5	36	28				
				M27 × 2		36				
63	29	45	224	M27 × 2	36	36	82	117	116	54
				M27 × 2	45	36				
				M33 × 2		45				
80	36	54	250	M33 × 2	45	45	91	134	130	62
				M33 × 2	56	45				
				M42 × 2		56				
100	37	57	300	M42 × 2	56	56	108	162	158	75
				M42 × 2	70	56				
				M48 × 2		63				
125	37	60	325	M48 × 2	70	63	121	174	192	92
				M48 × 2	90	63				
				M64 × 3		85				

Table 1 (*concluded*)

Dimensions in millimetres

Bore	*VE*	*WF*	*ZJ*	*KK*	*MM*	*A*	*Y*	*PJ*	*D*	*OH*[1)]
160	41	66	370	M64 × 3	90	85	143	191	238	115
				M64 × 3	110	85				
				M80 × 3		95				
200	45	75	450	M80 × 3	110	95	190	224	285	138
				M80 × 3	140	95				
				M100 × 3		112				
250	64	96	550	M100 × 3	140	112	—	—	365	—
				M100 × 3	180	112				
				M125 × 4		125				
320	71	108	660	M125 × 4	180	125	—	—	455	—
				M125 × 4	220	125				
				M160 × 4		160				
400	90	130	740	M160 × 4	220	160	—	—	565	—
				M160 × 4	280	160				
				M200 × 4		200				
500	110	163	890	M200 × 4	280	200	—	—	645	—
				M200 × 4	360	200				
				M250 × 6		250				

NOTE — If other piston rod diameters or other thread types are required, use those identified in ISO 3320 and ISO 4395.

1) Dimension *OH* is optional and only pertains to threaded ports.

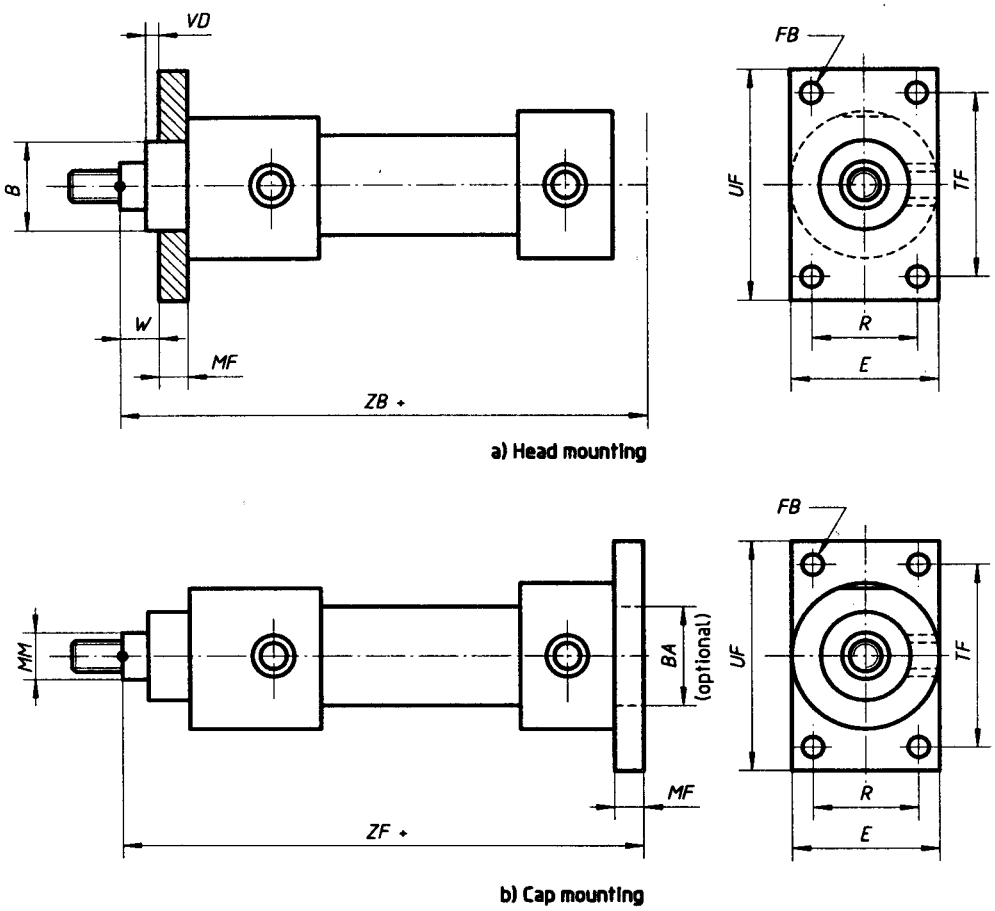


Figure 2 — MF1 — Head rectangular flange mounting and MF2 — Cap rectangular flange mounting

Table 2 — Dimensions of rectangular flange mounting

Dimensions in millimetres

Bore	*W*	*TF*	*FB*	*R*	*ZF*	*ZB*	*VD*	*B, BA*	*UF*	*E*	*MF*
25	16	69,2	6,6	28,7	162	158	3	32	85	60	12
32	16	85	9	35,2	186	178	3	40	105	70	16
40	16	98	9	40,6	206	198	3	50	115	80	16
50	18	116,4	11	48,2	225	213	4	60	140	100	20
63	20	134	13,5	55,5	249	234	4	70	160	120	25
80	22	152,5	17,5	63,1	282	260	4	85	185	135	32
100	25	184,8	22	76,5	332	310	5	106	225	160	32
125	28	217,1	22	90,2	357	335	5	132	255	195	32

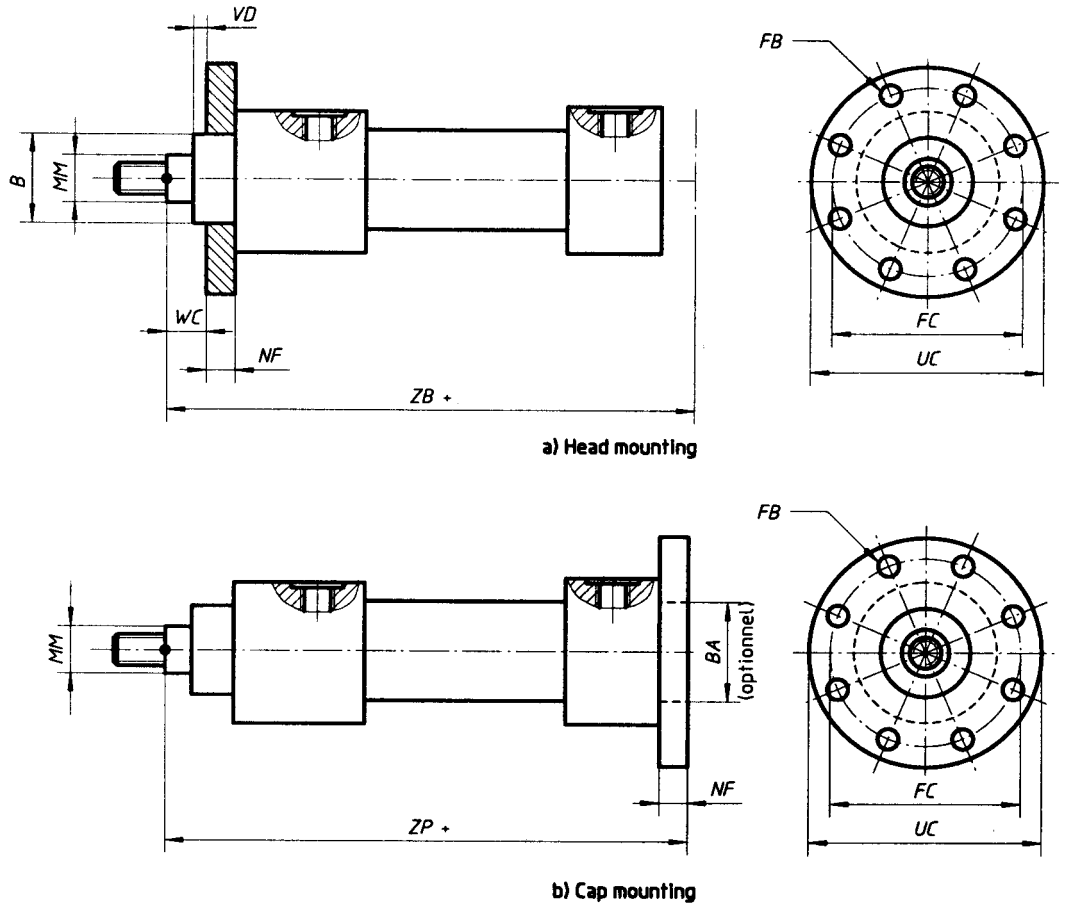


Figure 3 — MF3 — Head circular flange mounting and MF4 — Cap circular flange mounting

Table 3 — Dimensions of circular flange mounting

Dimensions in millimetres

Bore	*VD*	*WC*	*FB*	*FC*	*ZP*	*ZB*	*B, BA*	*UC*	*NF*
25	3	16	8 × Ø6,6	75	162	158	32	90	12
32	3	16	8 × Ø9	92	186	178	40	110	16
40	3	16	8 × Ø9	106	206	198	50	125	16
50	4	18	8 × Ø11	126	225	213	60	150	20
63	4	20	8 × Ø13,5	145	249	234	70	170	25
80	4	22	8 × Ø17,5	165	282	260	85	195	32
100	5	25	8 × Ø22	200	332	310	106	240	32
125	5	28	8 × Ø22	235	357	335	132	275	32
160	5	30	8 × Ø22	280	406	380	160	320	36
200	5	35	8 × Ø26	340	490	480	200	385	40
250	8	40	8 × Ø33	420	606	580	250	490	56
320	8	45	8 × Ø39	520	723	710	320	600	63
400	10	50	8 × Ø45	640	820	790	400	730	80
500	10	63	12 × Ø45	720	990	940	500	810	100

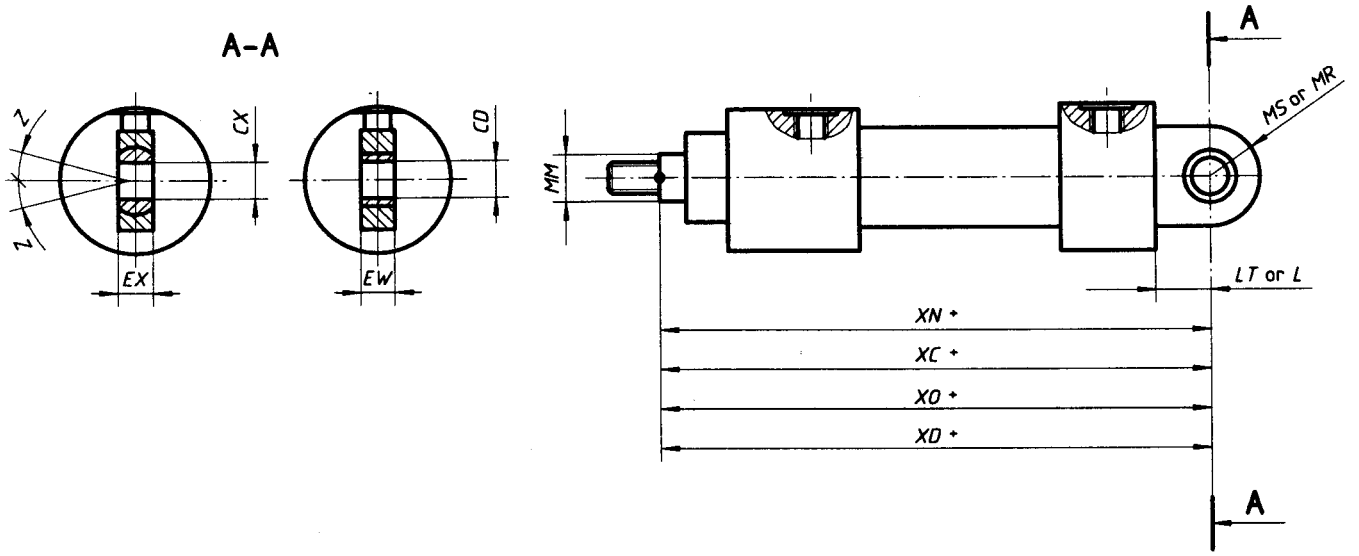


Figure 4 — MP3 – Cap fixed eye mounting, MP4 – Cap detachable eye mounting, MP5 – Cap fixed eye with spherical plain bearing mounting and MP6 – Cap detachable eye with spherical plain bearing mounting

Table 4 — Dimensions of cap eye mounting

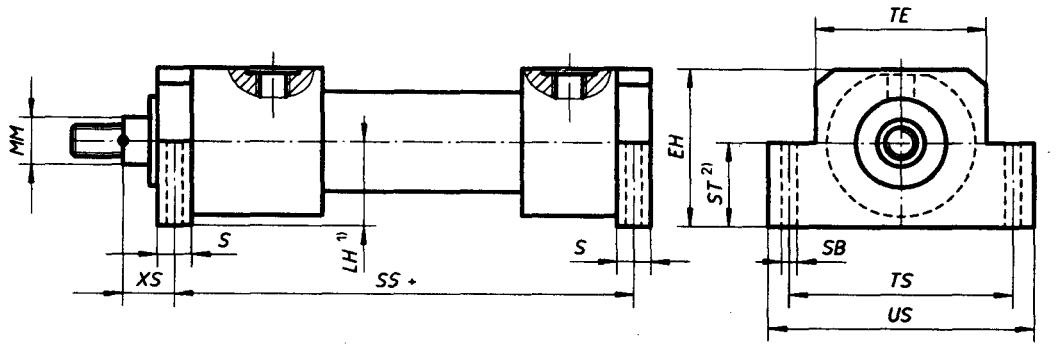
Dimensions in millimetres

Bore	*CD*[1] or *CX*[2]	*EW*[1] or *EX*[2]	*L*[1] or *LT*[2]	*MR*[1] or *MS*[2]	*XC, XD, XO* or *XN*[3]	Tilting angle *Z*
25	12	12	16	16	178	
32	16	16	20	20	206	4°
40	20	20	25	25	231	
50	25	25	32	32	257	
63	32	32	40	40	289	
80	40	40	50	50	332	
100	50	50	63	63	395	
125	63	63	71	71	428	
160	80	80	90	90	505	
200	100	100	112	112	615	
250	125	125	160	160	773	
320	160	160	200	200	930	
400	200	200	250	250	990	
500	250	250	320	320	1 210	

1) The dimensions *CD, EW, L* and *MR* are valid for mounting types MP3 and MP4.

2) The dimensions *CX, EX, LT* and *MS* are valid for mounting types MP5 and MP6.

3) The dimension *XC* is valid for mounting type MP3; the dimension *XD* is valid for mounting type MP4; the dimension *XO* is valid for mounting type MP5; the dimension *XN* is valid for mounting type MP6.



1) Dimension *LH* is the distance from the centreline of the cylinder to the bottom of the mounting lug.

2) Dimension *ST* is the height of the mounting lug.

Figure 5 — MS2 — Side lugs mounting

Table 5 — Dimensions of side lugs mounting

Dimensions in millimetres

Bore	*S*	*XS*	*SS*	*TE*	*TS*	*US*	*SB*	*EH*	*LH*	*ST*
25	20	18	142	56	75	92	9	60	32	32
32	25	19,5	163	67	90	110	11	72	38	38
40	25	19,5	183	78	100	120	11	82	43	43
50	32	22	199	95	120	145	14	100	52	52
63	32	29	211	116	150	180	18	120	62	62
80	40	34	236	130	170	210	22	135	70	70
100	50	32	293	158	205	250	26	161	82	82
125	56	32	321	192	245	300	33	196	100	100
160	60	36	364	238	295	350	33	238	119	119
200	72	39	447	285	350	415	39	288	145	145

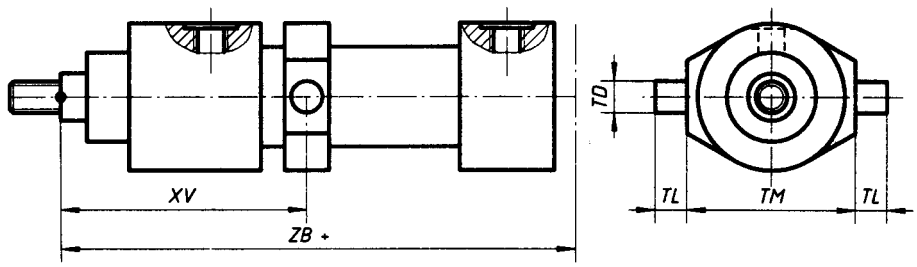


Figure 6 — MT4 — Intermediate trunnion (male) mounting

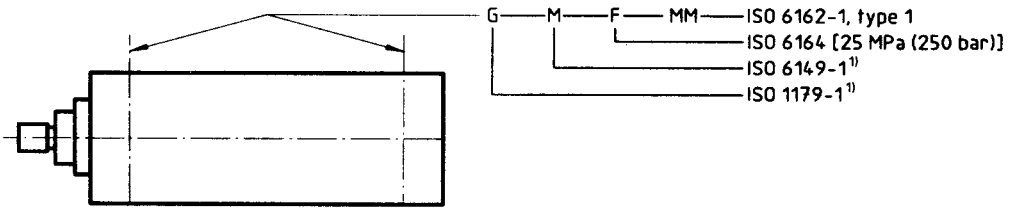
Table 6 — Dimensions of intermediate trunnion (male) mounting

Dimensions in millimetres

Bore	*TD*	*TL*	*TM*	*XV*	*ZB*
25	12	10	63	As agreed between manufacturer and user	158
32	16	12	75		178
40	20	16	90		198
50	25	20	105		213
63	32	25	120		234
80	40	32	135		260
100	50	40	160		310
125	63	50	195		335
160	80	63	240		380
200	100	80	295		480
250	125	100	370		580
320	160	125	470		710
400	200	160	570		790
500	250	250	700		940

Table 7 — Port and flange sizes

Dimensions in millimetres



Bore	ISO 1179-1 port		ISO 6149-1 port		ISO 6164 square flange				ISO 6162-1 rectangular flange				
	G		M		F				MM				
	EE	*EC*	*EE*	*EC*	Nominal flange size DN	*FF*	*EA*	*ED*	Nominal flange size DN	*FF*	*EA*	*EB*	*ED*
		ref.		ref.		max.				0 −1,5	±0,25	±0,25	
25	G 1/4	7,5	M14 × 1,5	7,5	—	—	—	—	—	—	—	—	—
32	G 3/8	9	M18 × 1,5	11	—	—	—	—	—	—	—	—	—
40 50	G 1/2	14	M22 × 1,5	14	—	—	—	—	—	—	—	—	—
63 80	G 3/4	18	M27 × 2	18	13	15	29,7	M8 × 1,25	13	12,7	17,5	38,1	M8 × 1,25
100 125	G 1	23	M33 × 2	23	19	20	35,4	M8 × 1,25	19	19,1	22,3	47,6	M10 × 1,5
160 200	G 1 ¼	30	M42 × 2	30	25	25	43,8	M10 × 1,5	25	25,4	26,2	52,4	M10 × 1,5
250 320	G 1 ½	36	M48 × 2	36	32	32	51,6	M12 × 1,75	32	31,8	30,2	58,7	M10 × 1,5
400 500	—	—	M60 × 2	44	38	38	60,1	M16 × 2	38	38,1	35,7	69,9	M12 × 1,75

CAUTION – When selecting the largest diameter piston rod in a given bore size in connection with hydraulic systems where pull loads and/or pressure intensification effects may be generated, the pressure in the piston rod cavity of the cylinder can be two or more times the working pressure of the hydraulic system. In these cases, flange ports in accordance with ISO 6162 and ISO 6164, as shown in this table, may not have sufficient pressure ratings. When flange ports with a higher pressure rating are needed, they can be selected from the higher pressure series in ISO 6162-1 and ISO 6164.

1) For threaded ports, ISO 6149-1 is preferred.

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6099 : 1985 Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types	IS 15168 : 2002 Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types	Identical
ISO 6149-1 : 1993 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1 : Ports with O-ring seal in truncated housing	IS 13170 (Part 1) : 1999 Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing: Part 1 Ports with O-ring seal in truncated housing (*first revision*)	do
ISO 8135 : 1999 Hydraulic fluid power — Single rod cylinders, 16 MPa (160 bar) medium and 25 MPa (250 bar) series — Tolerances	IS 13434 : 2005 Hydraulic fluid power — Single rod cylinders, 16 MPa (160 bar) medium and 25 MPa (250 bar) series — Tolerances (*first revision*)	do

The Technical Committee responsible for the preparation of this standard has reviewed the provisions of the following ISO Standards and has decided that the same are acceptable for use in conjunction with this standard:

ISO 1179-1[1)]	Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1 : Threaded ports
ISO 6162-1[1)]	Hydraulic fluid power — Flange connectors with split or one-piece flange clamps and metric or inch screws — Part 1 : Flange connectors for use at pressure of 3.5 MPa (35 bar) to 35 MPa (350 bar), DN 13 to DN 127
ISO 6164 : 1994	Hydraulic fluid power — Four-screw, one-piece square-flange connections for use at pressures of 25 MPa and 40 MPa (250 bar and 400 bar)

[1)] To be published.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc : No. **MGP/BP 15 (0441).**

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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